

Chapter 3: Genetic Nomenclature

Abbreviations for specific traits

- **Amino Acids: Gly, Val**
- **Carbon source: Lac, Glu, Man**
- **Nucleotides: Pur, Ade**
- **Vitamins: Bio**

Other functions

- **Antibiotic resistance:**
- **DNA polymerase:**
- **RNA polymerase:**

Gene vs Protein

- *rpo* is gene name for Rpo protein
- *galk* is gene name for GalK protein
- *lacZ* is gene name for LacZ protein

Genotype vs Phenotype

- *galk* = Gal⁻
- *lacZ* = Lac⁻
- *lacY* = Lac⁻

Wild-type vs Mutant: Differences in Genotype/Phenotype

Wild-type:

Mutant:

Allele: different forms of the same gene

- **Wild-type allele: *bio*⁺**
- **Mutant allele: *bio*⁻**

Prototroph vs Auxotroph

Differences in the ability to synthesize or utilize metabolic constituents

- **Prototroph:**
- **Auxotroph: A mutant that cannot make or use a growth substance compared to the wild-type**
 - **Trp⁻ auxotroph would need tryptophan added to medium for growth**
 - **Mutants are relatively easy to select for by colony transfers to different types of media.**

Strain Genotypes and Corresponding Phenotypes

HB101 genotype phenotype

Tet^S

bla

rec

bio

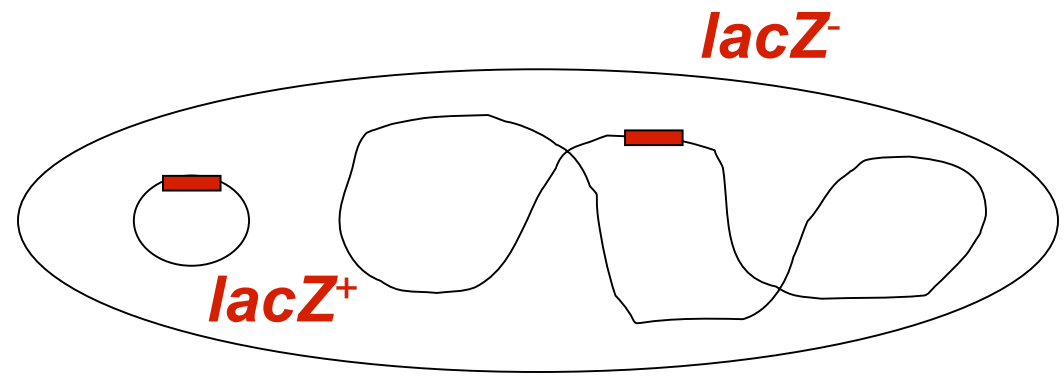
Recombination minus

Cannot synthesize biotin

<u>Strain</u>	<u>Genotype</u>	<u>phenotype</u>
JM109	<i>lac phe man</i>	Lac ⁻ Phe ⁻ Man ⁻
JM110	<i>lac phe⁺ man</i>	

Haploid vs Diploid vs Merodiploid

- Haploid:
- Diploid:
- Merodiploid: only diploid for a region of the chromosome
 - Two copies of some genes and only one copy of others



Types of Mutations

Silent

Missense

Nonsense

Frameshift

Suppressors

Insertions/Deletions

Inversions

Duplications

Translocations

Conditional lethal mutations:

Temperature sensitive mutations- DNA changes that result in changing an AA of a protein so that the protein no longer functions at higher temperature but still functions at lower temperatures.

- **Permissive temperature-**
- **Nonpermissive temperature- temperature at which the mutant protein denatures**

Reversion versus Suppression

Reversion: restoration of a mutated sequence of DNA to the wild type sequence

Suppression:

1) Intragenic suppressors: mutation in the same gene as the original mutation that can restore function

2) Nonsense suppressors:

- **Never complete b/c the nonsense codons are also recognized by release factors**

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Fig. 3.20

Chapter 3: Bacterial Inheritance and Mutations

Luria and Delbruck Experiment: Random Mutation vs. Directed Change

- **Random mutation hypothesis:**

- **Directed change hypothesis:**

Luria-Delbruck Experiment

- Bacterium: *E. coli*
- Selective agent: bacteriophage T1

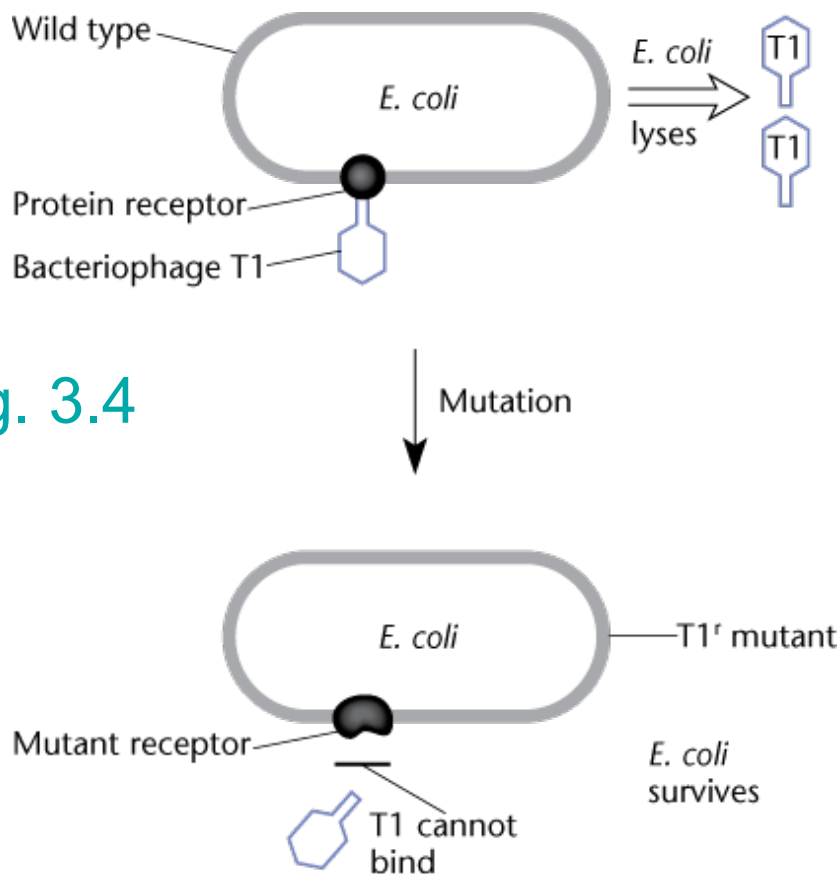


Fig. 3.4

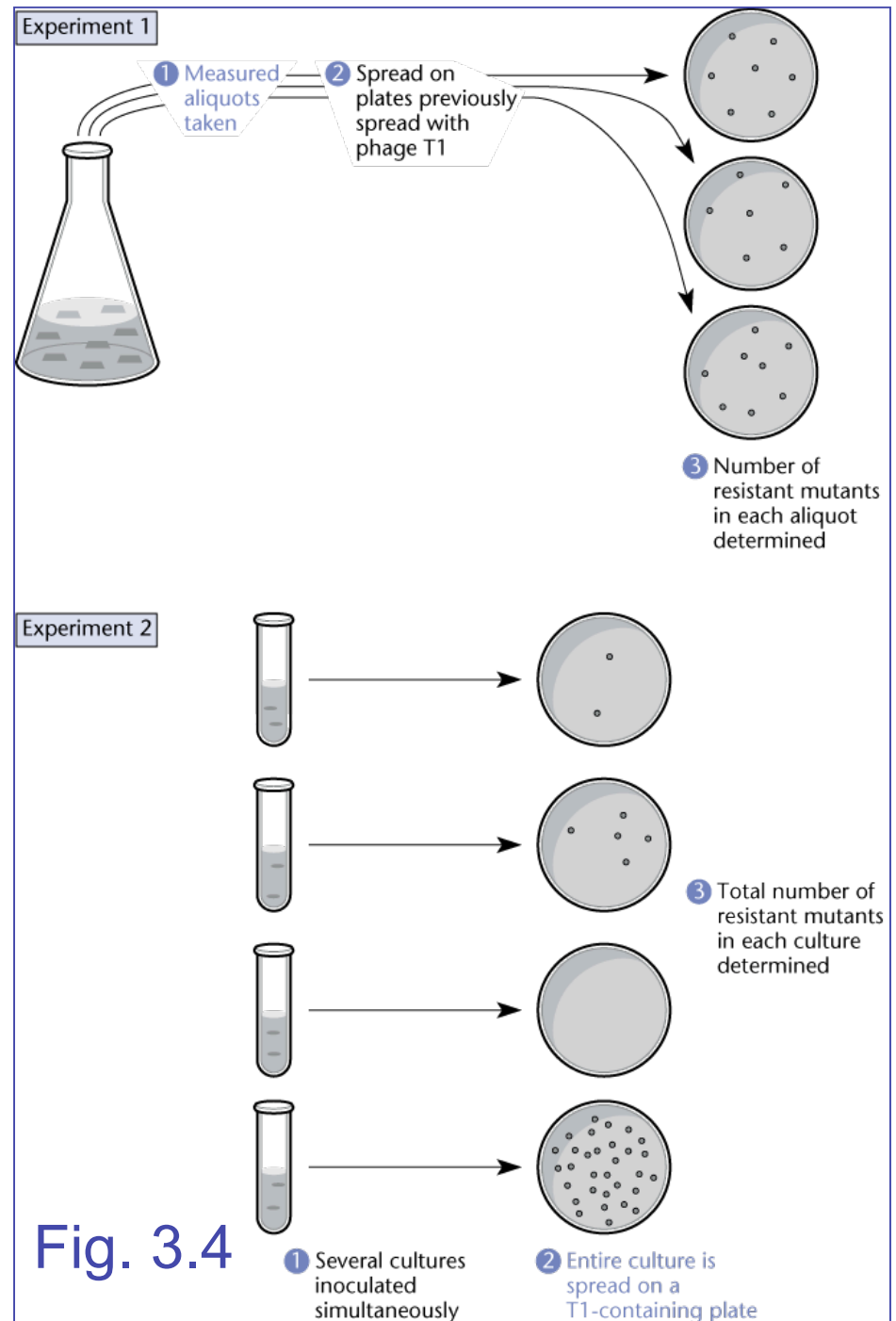


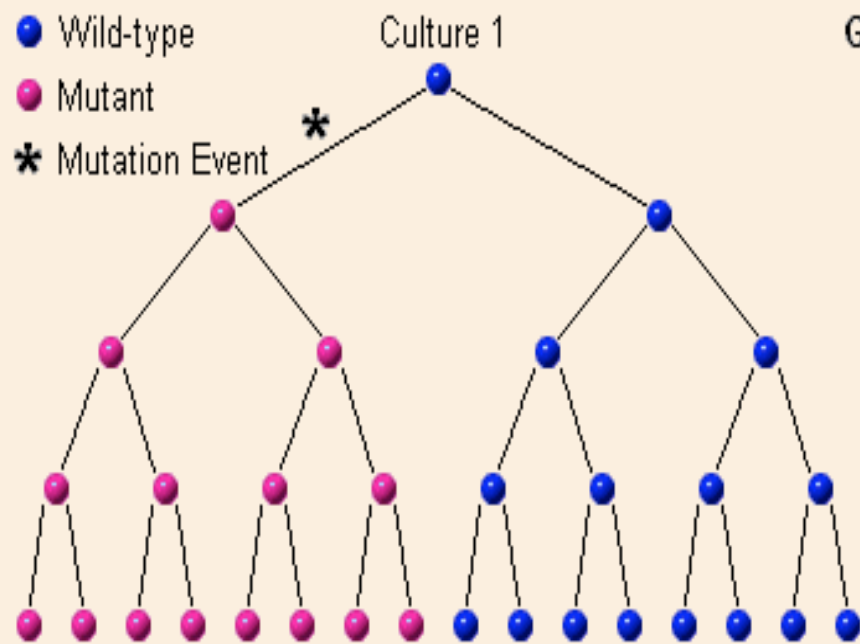
Fig. 3.4

Figure 1. Luria-Delbrück Experiment

● Wild-type

● Mutant

* Mutation Event



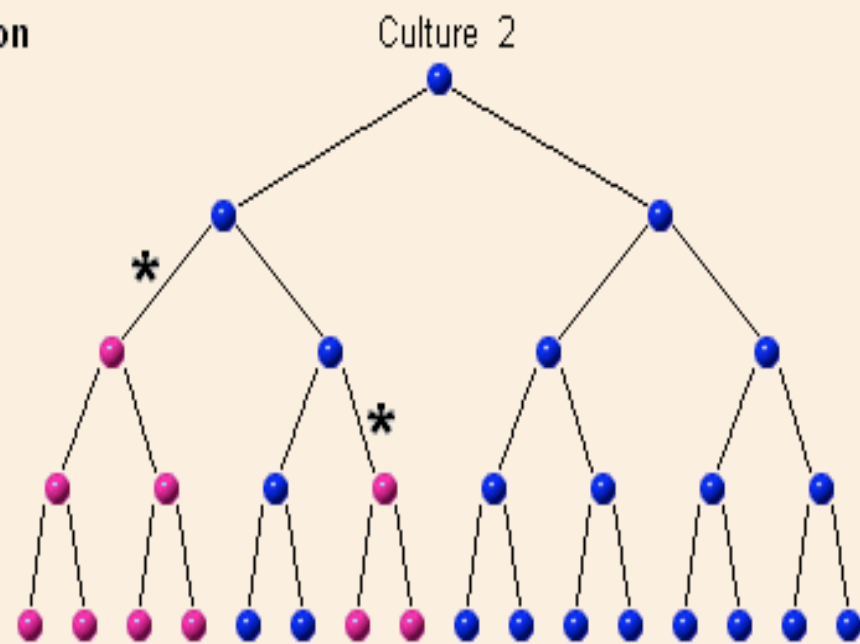
Generation

1st

2nd

3rd

4th



Lederbergs' Experiment: Replicate Plating Method

1.

2.

3.

4. Grew up selected colonies in liquid medium w/o antibiotic and then plated on solid medium with antibiotic

5. A great deal more antibiotic resistant colonies resulted even though the parent culture had not been exposed to antibiotic